In the Specification:

Please amend the Specification as follows:

Please replace the paragraph beginning on page 1, line 6, with the following amended paragraph:

The present invention relates to a head positioning control method and device that reads a positioning signal of a storage disk and positions a head in a storage disk apparatus that uses the head to ~~read information from or~~ read/write information from/to the storage disk and more particularly to a head positioning control method and device for a storage disk device with a plurality of heads.

Please replace the paragraph beginning on page 1, line 16, with the following amended paragraph:

Storage disk devices, such as magnetic disk devices, are widely used as storage devices in computers. In these types of storage disk devices, the format of the storage disk is divided into sectors. Servo signals ~~(position signals)~~ are recorded onto these sectors. The head reads these servo signals and is positioned at the ~~centre~~ center of a track. High-density recording is required in these types of storage disk devices.

Please replace the paragraph beginning on page 2, line 1, with the following amended paragraph:

As shown in Fig. 12, a magnetic disk device has a magnetic disk 90 and magnetic heads 91-a through 91-d. Servo signals ~~(position signals)~~ are recorded for each sector on the magnetic disk 90. Magnetic heads 91-a through 91-d read information from and write information to the magnetic disk 90. The spindle motor 92 rotates the magnetic disk 90. The voice coil motor 93 positions the magnetic heads 91-a through 91-d.

Please replace the paragraph beginning on page 2, line 9, with the following amended paragraph:

The servo signal demodulator (Figure 12) detects the servo signal from the read output of one of the magnetic heads 91-a through 91-d in response to a servo gate signal and demodulates the servo signal into a position signal. The read-write circuit ~~96,~~ 96 demodulates read data from the output read from the magnetic heads 91-a through 91-d and supplies write data to magnetic heads 91-a through 91-d.

Please replace the paragraph beginning on page 2, line 16, with the following amended paragraph:

The control circuit 95 calculates the current head position in response to the demodulated position signal and creates a drive value for the voice coil motor 93. That is, during seek control (coarse control), the control ~~circuit 94~~ circuit 95 calculates the current

position from the ~~position~~ servo signal and creates a current indication value in response to the distance ~~seek moves~~ from the target position. Also, while on track (during fine control), the control circuit 95 determines the deviation of the head from the ~~centre~~ center of the track from the ~~position~~ servo signal and creates a current indication value.

Please replace the paragraph beginning on page 3, line 10, with the following amended paragraph:

As shown in Fig. 13, the servo signals SV read by each head 0 through 2 (91-a through 91-c) are produced with the same timing. For example, when head 0 is switched over to head 1, the time when the servo signal SV is read does not change. That is, the ~~position~~ servo signals for each head exist at the same time. Therefore, the servo gate signal for detecting the servo signal is produced at the same time regardless of the head involved.

Please replace the paragraph beginning on page 3, line 18, with the following amended paragraph:

Fig. 14 shows the method called the staggered sector for recording servo signals SV. The times when the servo signals SV for each head are written are staggered in constant time intervals T1. This method enables heads to be sequentially selected and the servo signal to be sequentially written when a servo signal is written to a magnetic disk. Accordingly, the servo signals can be written rapidly. In this method, the times at which

servo gate signals, which ~~detect~~ are used in detecting the servo signals, are produced are staggered using a constant interval.

Please replace the paragraph beginning on page 4, line 25, with the following amended paragraph:

That is, the slight discrepancies in the positions of each head in the magnetic disk device, the slight discrepancies in the positions of the external write head and the internal read head, and the slight discrepancy in the mounting position of each magnetic disk cause the servo signal time interval between heads to vary. In Fig. 15, the time interval T1 between head 0 and head 1 is different ~~to the~~ from the time interval T2 between head 2 and head 0.

Please replace the paragraph beginning on page 5, line 27 with the following amended paragraph:

In an aspect of the present invention, the storage disk apparatus comprises a storage disk for recording ~~position~~ servo signals, a plurality of heads for reading information on the storage disk, an actuator for moving the heads, and a control circuit that positions the heads based on ~~position~~ servo signals read from the storage disk by the selected head.

Please replace the paragraph beginning on page 6, line 7, with the following amended paragraph:

This head positioning control method comprises a step for synchronizing the time of a ~~detection~~ servo gate signal read by the head to which switching for detecting a ~~position~~ servo signal with the time of a ~~position~~ servo signal that is read by the head to which switching is directed in response to a head switching cue, and a step of reading a head position signal in response to the synchronized detection signals and positioning the head in response to the read position signal.

Please replace the paragraph beginning on page 6, line 15, with the following amended paragraph:

The present invention synchronizes the time at which a ~~detection~~ servo gate signal is produced with the time of the ~~position~~ servo signal for the head to which switching is directed in response to a head switching cue. This means that because the time at which the ~~detection~~ servo gate signal is generated is synchronized with the time of the ~~position~~ servo signal for the head to which switching is directed, that ~~position~~ servo signal can be detected even if the operation to find the ~~position~~ servo signal at the time head switching occurs is omitted. Therefore, the head switching time can be reduced and fast head switching enabled.

Please replace the paragraph beginning on page 6, line 26, with the following amended paragraph:

Also, in another aspect of the present invention, the synchronization step comprises a step for determining the time at which the ~~position~~ servo signal is read by the head to which switching is directed in response to the head switching cue, and a step for synchronizing the time of the ~~detection~~ servo gate signal with that determined time.

Please replace the paragraph beginning on page 7, line 14, with the following amended paragraph:

In still another aspect of the present invention, the time determining step is a step for determining the time difference between the time of detection of the above ~~position~~ servo signal for the head at which switching originates and the time of detection of the above ~~position~~ servo signal for the head to which the above switching is directed. Furthermore, the synchronizing step comprises a step that shifts in time the above ~~detection~~ servo gate signal by that time difference.

Please replace the paragraph beginning on page 7, line 23, with the following amended paragraph:

In still another aspect of the present invention, the time determining step comprises a step for determining the detection time for the ~~position~~ servo signal of the head

prior to switching, a step for determining the detection time for the said ~~position~~ servo signal of the head to which switching is directed, and a step for determining the time difference between the two times.

Please replace the paragraph beginning on page 8, line 3, with the following amended paragraph:

In still another aspect of the present invention, the positioning step comprises a step for determining the time difference between the detection time for the head prior to the above ~~switching in~~ switching is done in response to a head switching cue and the detection time for the head to which switching is directed, a step for determining whether or not the time difference is shorter than the interval for one sample, and a step for inhibiting positioning in response to above detection signal when the time difference is shorter than the interval for one sample.

Please replace the paragraph beginning on page 10, line 3, with the following amended paragraph:

As shown in Fig. 1, the magnetic disk drive 1 comprises the magnetic disk 2 and magnetic heads 3a through 3d. Servo signals are embedded in each sector of the data track in this magnetic disk 2. As shown in Fig. 3, the servo signal comprises the servo mark signal used to ~~show~~ identify the servo signal, a track number that ~~shows~~ identifies the track

number, and a two-phase servo signal comprising position signals PosA, PosB, PosC, and PosD.

Please replace the paragraph beginning on page 10, line 11, with the following amended paragraph:

Magnetic heads 3a through 3d read and write information from/on the magnetic disk 2. The spindle motor 4 rotates magnetic disk 2. The voice coil motor 5 positions magnetic heads 3a through 3d to a ~~desired~~ cylinder track of magnetic disk 2. The servo gate generator 6 produces the servo gate signal with a servo signal period Ts. In response to the servo gate signal, the position detection circuit 7 demodulates the servo signal from magnetic heads 3a through 3d ~~into position~~ into a position signal.

Please replace the paragraph beginning on page 10, line 25, with the following amended paragraph:

The micro-controller 11 comprises a microprocessor, an analog to digital converter and a digital to analog converter, and reads ~~position~~ servo signals in response to the servo gate signal. The controller 11 calculates the current head position from the position signal and creates a current indication value in response to the distance from the target position.

Please replace the paragraph beginning on page 11, line 16, with the following amended paragraph:

As shown in Fig.2, the servo gate generator 6 comprises a time setting register 20, a counter 21, a comparison unit 22, and a gate generation unit 23. The time setting register 20 sets the time at which the servo gate will be generated from the micro-controller 11. The counter 21 counts the number of reference clock pulses. The comparison unit 22 compares the time set in register 20 and the value of the counter 21 and produces a matched output when the two match. The comparison unit 22 sends reset data to the counter 21 when the set time and the counted value match. In response to the matched output from the comparison unit 22, the gate generation unit 23 generates a servo gate signal.

Please replace the paragraph beginning on page 14, line 21, with the following amended paragraph:

(S3) The MCU 11 determines whether or not the time difference Td is larger than the servo signal period Ts. When the time difference Td is not larger than the period Ts, the interval between servo gate signals will be smaller than the period Ts. This means that while the servo period Ts is not being reached, servo interruption will be generated and MCU 11 processing may not occur in time. Therefore, when the time difference Td is not greater than the period Ts, the servo gate signal will be delayed by one sample period. In other words Td will be converted to (Td + Ts).

Please replace the paragraph beginning on page 15, line 19, with the following amended paragraph:

In this way, the servo gate signals are synchronized at the time of the ~~position~~ servo signal for the head to which switching is directed. Therefore, the time discrepancies between ~~position~~ servo signals for all heads are stored and the time difference between the servo signals of current head and the servo signals of head to which switching is directed is calculated. The time at which the servo gate signal is generated is then synchronized with this time difference. Fig. 5 shows the relationship between the servo signals for each head when heads are switched from head 0 to head 1 and the servo gate signals. In this example, the time discrepancy for head 0 Ta is "0" and the time discrepancy between head 0 and head 1 is Tb. The servo gate signal shown is for when the time difference Td is smaller than the sample period Ts.

Please replace the paragraph beginning on page 18, line 5, with the following amended paragraph:

As with memory 16 in Fig. 2, the gate time interval memory 36 stores the servo gate time discrepancies between heads 1 and 2 and the standard head. The calculation unit 33 reads the gate time interval memory 36 using the head number in the head number setting unit 30 and then obtains the time discrepancy Tb for the head to which switching is directed. The calculation unit 33 reads the gate time interval memory 36 and obtains the current head

time discrepancy Ta by using the head number in the register 31. The calculation unit 33 then subtracts time discrepancy Tb from time discrepancy Ta to obtain the time difference Td.

Please replace the paragraph beginning on page 34, line 1, with the following amended paragraph:

In a head positioning method and device in which the position of ~~position~~ servo signals between heads is not uniform, it is aimed to reduce the time taken to find the position servo signals even when heads are switched. The storage disk device comprises ~~a~~ storage ~~disk 1~~ disks with the ~~position~~ servo ~~signal~~ signals, a plurality of heads ~~3a through 3d~~ that read the information from the recording ~~disk 1~~ storage disks, an ~~actuator 5~~ actuator that moves the heads, and a control ~~circuit 11~~ circuit that positions the heads based on the ~~position~~ servo signals read from the ~~recording disk~~ storage disks by the selected head. This control circuit ~~11 comprises~~ includes a synchronization ~~circuit 6~~ circuit that, in response to a head switching cue, synchronizes the time of the ~~detection~~ servo gate signal (of the head to which switching is directed) for detecting the ~~position~~ servo signal with the time of the ~~position~~ servo signal read by the head to which switching is directed, and a processing ~~circuit 11~~ circuit that reads the ~~position~~ servo signal for the head in response to the synchronized detection signal and positions the head in response to the ~~position~~ servo signal read.